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IS 13893 (1994): Polyurethane soles semirigid [CHD 19: Footwear]

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पोलीयुरिथेन की तला, अर्धसख्त — विशिष्टि

Indian Standard

POLYURETHANE SOLE, SEMIRIGID — SPECIFICATION

UDC 685.312.9

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

December 1994

Price Group 3

Footwear Sectional Committee, CHD 019

FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Footwear Sectional Committee had been approved by the Chemical Division Council.

Polyurethane soles are intended for the fabrication of footwear-bottom for general purposes as well as repair of the same. The details of design aspect of soles and the composition of polyurethane mix have been kept out of the scope of this standard, prescribing only the essential physcial requirements. The manufacturer of the soles may give a declaration of the ingredients if specifically asked by the purchaser.

The sizes of the sole have not been prescribed but it is expected that helpful guidance will be drawn from IS 1638 : 1970 'Sizes and fittings of footwear (*first revision*)', IS 8751 (Part 1) : 1978 'Footwear sizes in mondopoint system : Part 1 Fundamental characteristics' and IS 8751 (Part 2) : 1978 'Footwear sizes in mondopoint system : Part 2 Length grading while deciding about the sizes'. These soles are also not recommended for use in industrial shoes.

In the preparation of this standard useful assistance has been derived from DIN 53516-1977 'Methods of test — Abrasion strength', published by DIN Deutsches Institut für Normung, Germany.

The composition of the committee responsible for formulation of this standard is given at Annex D.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

POLYURETHANE SOLE, SEMIRIGID— SPECIFICATION

1 SCOPE

1.1 This standard prescribes the requirements and methods of sampling and test for polyurethane, semirigid, unit-full soles.

1.2 This standard does not cover the requirements of polyurethane sole in solid or rigid form.

2 REFERENCES

The Indian Standards listed in Annex A are necessary adjuncts to this standard.

3 TERMINOLOGY

For the purpose of this standard, the definitions given in IS 2050 : 1991 shall apply.

4 REQUIREMENTS

4.1 Design

The soles shall have antislip design, or any other suitable design as agreed to between the purchaser and the supplier.

4.2 Thickness

The thickness of the soles shall be not less than 10 mm, at any portion of the sole, when measured in accordance with the method prescribed in IS 12240 (Part 1) : 1988.

4.3 Physical Requirements

Unless otherwise agreed to between the purchaser and the supplier the polyurethane soles shall be tested for the requirements prescribed in **4.3.1** and **4.3.2** within three months from the date of receipt of the product.

4.3.1 The product shall comply with the physical requirements given in Table 1.

4.3.2 The soles shall also withstand an ageing test at 70±1°C for 168 h in accordance with IS 3400 (Part 4) : 1987 on completion of which it shall not show any sign of softening, crack and shall not be deformed when examined through unaided eye.

5 PACKING AND MARKING

5.1 Packing

The soles shall be packed as agreed to between the purchaser and the supplier. Each package shall contain soles of same size only and shall be marked with the name of the item, size, manufacturer's name or its recognized trade-mark, if any, and batch/code number.

5.2 Marking

Each sole shall be marked with the following particulars on their outer waist:

a) Name of the manufacturer and/or its recognized trade-mark, if any;
b) Size of the footwear for which it is intended; and
c) Batch/Code No.

5.2.1 *BIS Certification Marking*

The product may also be marked with Standard Mark.

5.2.1.1 The use of the Standard Mark is governed by the provisions of Bureau of Indian Standards Act, 1986 and the Rules and Regulations made thereunder. The details of conditions under which the licence for the use of Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

6 SAMPLING

6.1 For the purpose of ascertaining the conformity of sole in a consignment to this standard, the scale of sampling and criteria for conformity shall be as prescribed in Annex C.

Table 1 Physical Requirements for Polyurethane Sole, Semirigid

(*Clause* 4.3.1)

Sl No.	Characteristic	Requirement	Method of Test, Ref to IS	Annex
(1)	(2)	(3)	(4)	(5)
i)	Relative density	0.50 to 0.70	12240 (Part 3) : 1988	
ii)	Hardness, degree Shore A	60 ± 5	12240 (Part2) : 1988	
iii)	Tensile strength, MPa, *Min*	6.0	12240 (Part 6) : 1988	
iv)	Elongation at break, percent, *Min*	450	do	
v)	Abrasion resistance, mg, *Min*	300 ± 30	—	Annex B
vi)	Flexural strength, No. of cycle, *Min*	60 000	12240 (Part 7) : 1988	
vii)	Cut growth after 120 000 cycles, percent, *Min*	200	do	

ANNEX A

(*Clause* 2)

LIST OF REFERRED INDIAN STANDARDS

IS No.	*Title*
2050 : 1991	Glossary of terms relating to footwear *(first revision)*
3400 (Part 4) : 1987	Methods of test for vulcanized rubbers : Part 4 Accelerated ageing *(second revision)*
4905 : 1968	Method for random sampling
12240	Method of test for polyvinyl chloride boots:
(Part 1) : 1988	Part 1 Measurement of thickness
(Part 2) : 1988	Part 2 Determination of durometer hardness Shore A
(Part 3) : 1988	Part 3 Determination of relative density
(Part 6) : 1988	Part 6 Determination of tensile strength and elongation at break
(Part 7) : 1988	Part 7 Flexing test-resistance to cut growth for soling material

ANNEX B

[*Table* 1, *Sl No.* (v)]

DETERMINATION OF ABRASION RESISTANCE

B-1 PRINCIPLE

This method is useful to calculate abrasion resistance of polyurethane sole by measuring weight loss. This is done by abrading a test piece against a rotating horizontal cylinder in an Abrasion Tester to which a sheet of emery paper is firmly fixed by means of adhesive along with the entire length of the roller evenly distributed around the circumference. The ends of the emery paper are butted together. The test piece holder is secured to a swinging arm pivoted in a support with centre line of the test piece tilted 3° out of the vertical axis and mounted such that the centre of the test piece just lies over the longitudinal axis of the cylinder. The mass of the rocker arm and of the test piece holder is adjusted so that, the test piece exerts a force of 10 N on the sheet of the emery paper. The test piece holder is equipped with a device to adjust the protrusion of the test piece from the test piece holder at the start of the test.

B-2 APPARATUS

B-2.1 The details of abrasion resistance tester are as follows:

i) Size of test piece holder	16 mm diameter, 6 mm thick
ii) Diameter of the cylinder	150 mm
iii) Length of the cylinder	470 mm
iv) Speed of the cylinder	40 r.p.m.
v) Total abrasion distance	40 metres

B-3 PROCEDURE

B-3.1 Prepare test piece with the help of moulding die. In case the sample is to be prepared with the help of cutting die, take a 6 mm slab, mount the cutting die on drilling machine and cut out the sample. Remove any hanging burr from the sample and weigh the sample to nearest 1 milligram.

B-3.2 Test emery cloth should be of grade 60 and size 450 mm wide × 474 mm long. Apply a thin coating of adhesive on the back of the abrasive cloth. Roll the emery cloth around the roller and bring back the second end so that, both the ends are butted together pressing the emery paper by hand around the roller so that it is firmly stuck to the adhesive tape.

B-3.3 Bring the test piece holder to the extreme left position with the help of switching the motor towards left. At the extreme left position the motor would stop automatically.

B-3.4 Insert the test piece in the holder in such a way that it projects 2 mm out of the grip of the mouth.

B-3.5 Swing the test piece holder bracket so that the test piece is placed on the abrasive surface. Start the motor so that the test piece holder bracket starts moving towards right. The motor would stop automatically on completion of the 40 metre abrasion distance.

B-4 RESULT

B-4.1 At the end of the test, take out the specimen and weigh it to the nearest milligram. Find out mass in loss. It gives abrasion resistance. It is generally expressed in mg (Loss in mass).

ANNEX C

(*Clause* 6.1)

SAMPLING OF POLYURETHANE SOLES, SEMIRIGID

C-1 SCALE OF SAMPLING

C-1.1 Lot

All polyurethane soles in a consignment belonging to the same size, design and batch or code of manufacture shall constitute a lot.

C-1.2 Samples shall be selected and examined from each lot separately for ascertaining the conformity of the material to the requirements of the specification.

C-1.3 The number of polyurethane soles to be selected from any lot shall depend on the size of the lot and shall be in accordance with col 2 and 3 of Table 2.

C-1.3.1 The polyurethane soles shall be selected at random from the lot. For random selection, procedure as given in IS 4905 : 1968 may be followed.

C-2 NUMBER OF TEST AND CRITERIA FOR CONFORMITY

C-2.1 Visual Characteristics

All the soles drawn under **C-1.3** shall be first examined for the pattern and finish as agreed to between the purchaser and the supplier. If the number of samples failing to satisfy any one or more of the requirements is less than or equal to the corresponding permissible number of defectives given in col 4 of Table 2 the lot shall be declared to have satisfied the requirements for these characteristics.

C-2.2 Thickness and Other Dimensional Characteristics

The lot which has been found satisfactory under C-2.1 shall be examined for dimensional requirements. For this purpose, the number of samples to be chosen from among those selected under **C-2.1**, is given in col 5 of Table 2. If the number of defectives found under this test is less than or equal to the permissible number given in col 6 of Table 2, the lot shall be considered to have satisfied the dimensional requirements.

C-2.3 Physical Requirements

The lot accepted under **C-2.1** and **C-2.2** shall be examined for physical requirements. For this purpose test pieces shall be taken from samples for each physical requirement, two samples shall be taken for physical tests if the lot size is 1 000 and below and three samples if it is above 1 000. There shall be no failures, if the lot is to be accepted under this clause.

Table 2 Scale of Sampling and Permissible Number of Defectives

(*Clause* C-1.3)

Sl No.	No. of Polyurethane Soles in the Lot	Visual Characteristics		Dimensional Characteristics	
		Sample Size	Permissible No. of Defectives	Sample Size	Permissible No. of Defectives
(1)	(2)	(3)	(4)	(5)	(6)
i)	Up to 500	13	1	6	0
ii)	501 to 1 000	20	1	10	1
iii)	1 001 to 3 000	32	2	16	1
iv)	3 001 to 5 000	50	3	25	2
v)	5 001 and above	80	5	40	3

ANNEX D

(*Foreword*)

COMMITTEE COMPOSITION

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Members	
Shri Krishanu Chatterjee (*Alternare to* Shri S.K. Bhadra)	
Shri Jane Alam	Council for Leather Exports, Kanpur
Shri M. P. Bajpai	Tannery and Footwear Corporation of India Ltd, Kanpur
Shri K. K. Hajela (*Alternate*)	
Shri A. Bandyopadhyay	Ministry of Defence (R&D), Kanpur
Shri B. B. Das (*Alternate*)	
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Shri S. Banerjee	Madura Coats Limited, Madurai
Shri K. S. Rama Rao (*Alternate*)	
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Shri A. K. Basu (*Alternate*)	
Shri J. Basak	Bihar Rubber Company, Ranchi
Shri J. Chakraborti	Standing Committee for Safety in Steel Industry, Durgapur
Shri Shib Kumar (*Alternate*)	
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Shri G. S. Lakhotia (*Alternate*)	
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Member Secretary

Shri P. Mukhopadhyay
Joint Director (Chem), BIS

(*Continued from page* 4)

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